Observations of C-band brightness temperatures and ocean surface wind speed and rain rate from the Hurricane Imaging Radiometer (HIRAD)

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HIRAD flew on the WB-57 over Earl and Karl during NASA's GRIP (Genesis and Rapid Intensification Processes) campaign in August – September of 2010. HIRAD is a new C-band radiometer using a synthetic thinned array radiometer (STAR) technology to obtain cross-track resolution of approximately 3 degrees, out to approximately 60 degrees to each side of nadir. (The resulting swath width for a platform at 60,000 feet is roughly 60 km, and resolution for most of the swath is around 2 km.) By obtaining measurements of emissions at 4, 5, 6, and 6.6 GHz, observations of ocean surface wind speed and rain rate can be retrieved. This technique has been used for many years by precursor instruments, including the Stepped Frequency Microwave Radiometer (SFMR), which has been flying on the NOAA and USAF hurricane reconnaissance aircraft for several years to obtain observations within a single footprint at nadir angle.

Results from the flights during the GRIP campaign will be shown, including images of brightness temperatures, wind speed, and rain rate. Comparisons will be made with observations from other instruments on the GRIP campaign, for which HIRAD observations are either directly comparable or are complementary. Features such as storm eye and eyewall, location of storm wind and rain maxima, and indications of dynamical features such as the merging of a weaker outer wind/rain maximum with the main vortex may be seen in the data. Potential impacts on operational ocean surface wind analyses and on numerical weather forecasts will also be discussed.